

**CPC****COOPERATIVE PATENT CLASSIFICATION****F23D****BURNERS** (generating combustion products of high pressure or high velocity F23R)**F23D 1/00****Burners for combustion of pulverulent fuel** (disposition of burners F23C)**F23D 1/005**

- . {burning a mixture of pulverulent fuel delivered as a slurry, i.e. comprising a carrying liquid (preparing slurries [F23K 1/02](#))}

**F23D 1/02**

- . Vortex burners, e.g. for cyclone-type combustion apparatus

**F23D 1/04**

- . Burners producing cylindrical flames without centrifugal action

**F23D 1/06**

- . Burners producing sheet flames

**Combustion of a liquid****F23D 3/00****Burner using capillary action****F23D 3/02**

- . Wick burners

**F23D 3/04**

- .. with flame spreaders ([F23D 3/12](#) takes precedence)

**F23D 3/06**

- .. Inverted wick burners, e.g. for illumination

**F23D 3/08**

- .. characterised by shape, construction, or material, of wick

**F23D 3/10**

- .. Blue-flame burners

**F23D 3/12**

- ... with flame spreaders

**F23D 3/14**

- ... with mixing of air and fuel vapour in a chamber before the flame

**F23D 3/16**

- .. using candles ([candles per se C11C](#))

**F23D 3/18**

- .. Details of wick burners

**F23D 3/20**

- ... Flame spreaders

**F23D 3/22**

- ... Devices for mixing evaporated fuel with air

**F23D 3/24**

- ... Carriers for wicks

**F23D 3/26**

- .... Safety devices thereon

**F23D 3/28**

- ... Wick-adjusting devices

**F23D 3/30**

- .... directly engaging with the wick

**F23D 3/32**

- .... engaging with a tube carrying the wick

**F23D 3/34**

- .... Wick stop devices; Wick-fixing devices

**F23D 3/36**

- ... Devices for trimming wicks

**F23D 3/38**

- ... Devices for replacement of wicks

**F23D 3/40**

- . the capillary action taking place in one or more rigid porous bodies

**F23D 5/00**                      **Burners in which liquid fuel evaporates in the combustion space, with or without chemical conversion of evaporated fuel**

- F23D 5/02                      . the liquid forming a pool, e.g. bowl-type evaporators, dish-type evaporators
- F23D 5/04                      . . Pot-type evaporators, i.e. using a partially-enclosed combustion space
- F23D 5/045                    . . . {with forced draft}
- F23D 5/06                      . the liquid forming a film on one or more plane or convex surfaces
- F23D 5/08                      . . on cascaded surfaces
- F23D 5/10                      . . on grids
- F23D 5/12                      . Details
- F23D 5/123                    . . {Inserts promoting evaporation}
- F23D 5/126                    . . {Catalytic elements}
- F23D 5/14                      . . Maintaining predetermined amount of fuel in evaporator
- F23D 5/16                      . . Safety devices
- F23D 5/18                      . . Preheating devices

**F23D 7/00**                      **Burners in which drops of liquid fuel impinge on a surface**

**F23D 9/00**                      **Burners in which a stream of liquid fuel impinges intermittently on a hot surface**

**F23D 11/00**                    **Burners using a direct spraying action of liquid droplets or vaporised liquid into the combustion space (spraying in general B05B, B05D)**

- F23D 11/001                    . {spraying nozzle combined with forced draft fan in one unit (nozzles per se [F23D 11/38](#))}
- F23D 11/002                    . {spraying nozzle arranged within furnace openings (refractory bricks or blocks specially shaped for burner openings [F23M 5/025](#))}
- F23D 11/004                    . . {for producing radiant heat}
- F23D 11/005                    . {with combinations of different spraying or vaporising means}
- F23D 11/007                    . . {combination of means covered by sub-groups [F23D 11/10](#) and [F23D 11/24](#)}
- F23D 11/008                    . . {combination of means covered by sub-groups [F23D 5/00](#) and [F23D 11/00](#)}
- F23D 11/02                      . the combustion space being a chamber substantially at atmospheric pressure
- F23D 11/04                      . the spraying action being obtained by centrifugal action
- F23D 11/06                      . . using a horizontal shaft
- F23D 11/08                      . . using a vertical shaft
- F23D 11/10                      . the spraying being induced by a gaseous medium, e.g. water vapour
- F23D 11/101                    . . {medium and fuel meeting before the burner outlet}

- F23D 11/102 . . . {in an internal mixing chamber}
- F23D 11/103 . . . . {with means creating a swirl inside the mixing chamber}
- F23D 11/104 . . . {intersecting at a sharp angle, e.g. Y-jet atomiser}
- F23D 11/105 . . . {at least one of the fluids being submitted to a swirling motion}
- F23D 11/106 . . {medium and fuel meeting at the burner outlet}
- F23D 11/107 . . . {at least one of both being subjected to a swirling motion}
- F23D 11/108 . . {medium and fuel intersecting downstream of the burner outlet}
- F23D 11/12 . . characterised by the shape or arrangement of the outlets from the nozzle
- F23D 11/14 . . . with a single outlet, e.g. slit
- F23D 11/16 . . in which an emulsion of water and fuel is sprayed
- F23D 11/18 . . the gaseous medium being water vapour generated at the nozzle
- F23D 11/20 . . . the water vapour being superheated
- F23D 11/22 . . the gaseous medium being vaporised fuel, e.g. for a soldering lamp, {or other gaseous fuel}
  
- F23D 11/24 . by pressurisation of the fuel before a nozzle through which it is sprayed by a substantial pressure reduction into a space
- F23D 11/26 . . with provision for varying the rate at which the fuel is sprayed
- F23D 11/28 . . . with flow-back of fuel at the burner, e.g. using by-pass
- F23D 11/30 . . . with return feed of uncombusted sprayed fuel to reservoir
  
- F23D 11/32 . by electrostatic means
  
- F23D 11/34 . by ultrasonic means {or other kinds of vibrations}
- F23D 11/345 . . {with vibrating atomiser surfaces}
  
- F23D 11/36 . Details {e.g. burner cooling means, noise reduction means}
- F23D 11/38 . . Nozzles (nozzles in general [B05B](#)); Cleaning devices therefor
- F23D 11/383 . . . {with swirl means}
- F23D 11/386 . . . {Nozzle cleaning}
- F23D 11/40 . . Mixing tubes [or chambers]; Burner heads
- F23D 11/402 . . . {Mixing chambers downstream of the nozzle}
- F23D 11/404 . . . {Flame tubes (not forming part of the burner [F23M 9/06](#))}
- F23D 11/406 . . . {Flame stabilising means, e.g. flame holders}
- F23D 11/408 . . . {Flow influencing devices in the air tube}
- F23D 11/42 . . Starting devices ([igniting F23Q](#))
- F23D 11/44 . . Preheating devices; Vaporising devices ([vaporising devices per se F23K 5/22](#))
- F23D 11/441 . . . { Vaporizing devices incorporated with burners}
- F23D 11/443 . . . . {heated by the main burner flame}
- F23D 11/445 . . . . . {the flame and the vaporiser not coming into direct contact}
- F23D 11/446 . . . . {heated by an auxiliary flame}
- F23D 11/448 . . . . {heated by electrical means}
- F23D 11/46 . . Devices on the vaporiser for controlling the feeding of the fuel

**F23D 14/00****Burners for combustion of a gas, e.g. of a gas stored under pressure as a liquid**

- F23D 14/02 . Premix gas burners, i.e. in which gaseous fuel is mixed with combustion air upstream of the combustion zone
- F23D 14/04 . . induction type, e.g. Bunsen burner, ({atmospheric or aerated gas burner})
- F23D 14/045 . . . {with a plurality of burner bars assembled together, e.g. in a grid-like arrangement}
- F23D 14/06 . . . with radial outlets at the burner head
- F23D 14/065 . . . . {with injector axis inclined to the burner head axis}
- F23D 14/08 . . . with axial outlets at the burner head
- F23D 14/085 . . . . {with injector axis inclined to the burner head axis}
- F23D 14/10 . . . with elongated tubular burner head
- F23D 14/105 . . . . [N. with injector axis parallel to the burner head axis]
  
- F23D 14/12 . Radiant burners
- F23D 14/125 . . {heating a wall surface to incandescence}
- F23D 14/14 . . using screens or perforated plates
- F23D 14/145 . . . {the burner plate being a screen}
- F23D 14/16 . . using permeable blocks
- F23D 14/18 . . using catalysis for flameless combustion
  
- F23D 14/20 . Non-premix gas burners, i.e. in which gaseous fuel is mixed with combustion air on arrival at the combustion zone ([F23D 14/30 to F23D 14/44 take precedence](#))
- F23D 14/22 . . with separate air and gas feed ducts, e.g. with ducts running parallel or crossing each other
- F23D 14/24 . . . at least one of the fluids being submitted to a swirling motion
  
- F23D 14/26 . with provision for a retention flame ([pilot flame igniters F23Q 9/00](#))
  
- F23D 14/28 . in association with a gaseous fuel source, e.g. acetylene generator, or a container for liquefied gas
  
- F23D 14/30 . Inverted burners, e.g. for illumination
  
- F23D 14/32 . using a mixture of gaseous fuel and pure oxygen or oxygen-enriched air ([F23D 14/38 takes precedence](#))
  
- F23D 14/34 . Burners specially adapted for use with means for pressurising the gaseous fuel or the combustion air ([F23D 14/38 takes precedence](#))
- F23D 14/36 . . in which the compressor and burner form a single unit
  
- F23D 14/38 . Torches, e.g. for cutting, brazing, welding or heating ({ nozzles for torches [F23D 14/52](#)})
- F23D 14/40 . . for welding ([F23D 14/44 takes precedence](#))
- F23D 14/42 . . for cutting ([F23D 14/44 takes precedence](#))
- F23D 14/44 . . for use under water

- F23D 14/46 . Details {e.g. noise reduction means}
- F23D 14/465 .. {for torches (F23D 14/52 takes precedence)}
- F23D 14/48 .. Nozzles ({injectors for mixing devices F23D 14/64}; for spraying or coating B05B)
- F23D 14/50 ... Cleaning devices therefor
- F23D 14/52 ... for torches; for blow-pipes
- F23D 14/54 .... for cutting or welding metal
- F23D 14/56 ... for spreading the flame over an area, e.g. for desurfacing of solid material, for surface hardening, for heating workpieces, (scarfing by applying flames B23K 7/00)
- F23D 14/58 ... characterised by the shape or arrangement of the outlet or outlets from the nozzle, e.g. of annular configuration
- F23D 14/583 .... {of elongated shape, e.g. slits}
- F23D 14/586 ..... {formed by a set of sheets, strips, ribbons or the like}
- F23D 14/60 .. Devices for simultaneous control of gas and combustion air (regulation of combustion in general F23N)
- F23D 14/62 .. Mixing devices; Mixing tubes
- F23D 14/64 ... with injectors
- F23D 14/66 .. Preheating the combustion air or gas
- F23D 14/68 .. Treating the combustion air or gas, e.g. by filtering, by moistening (in general B01)
- F23D 14/70 .. Baffles or like flow-disturbing devices
- F23D 14/72 .. Safety devices, e.g. operative in case of failure of gas supply (protection or supervision of pipe-line systems F17D 5/00)
- F23D 14/725 ... {Protection against flame failure by using flame detection devices (pilot flame igniters with interlock with main fuel supply F23Q 9/08)}
- F23D 14/74 ... Preventing flame lift-off (F23D 14/70 takes precedence)
- F23D 14/76 ... Protecting flame and burner parts
- F23D 14/78 ... Cooling burner parts
- F23D 14/80 ... Selection of a non-toxic gas
- F23D 14/82 ... Preventing flashback or blowback (F23D 14/70 takes precedence; {by use of a retention flame F23D 14/26}; in gas feed lines A62C 4/02)
- F23D 14/825 .... {using valves}
- F23D 14/84 .. Flame spreading or otherwise shaping (F23D 14/70 takes precedence)

#### Other burners

#### **F23D 17/00 Burners for combustion conjointly or alternatively of gaseous or liquid or pulverulent fuel**

- F23D 17/002 . {gaseous or liquid fuel}
- F23D 17/005 . {gaseous or pulverulent fuel}
- F23D 17/007 . {liquid or pulverulent fuel}

<b>F23D 21/00</b>	<b>Burners not otherwise provided for</b> { Note : combinations of spraying or vaporising means covered by sub-groups <a href="#">F23D 5/00</a> and <a href="#">F23D 21/00</a> are classified in <a href="#">F23D 11/008</a> }
<a href="#">F23D 21/005</a>	. { specially adapted for use in particular heating operations}
<b>F23D 23/00</b>	<b>Assemblies of two or more burners</b> (gas burners with provision for a retention flame <a href="#">F23D 14/26</a> ; disposition of burners F23C; for industrial furnaces F27)
<b>F23D 99/00</b>	<b>Subject matter not provided for in other groups of this subclass</b>
<a href="#">F23D 99/003</a>	. { specially adapted for use in particular heating operations}
<a href="#">F23D 99/006</a>	.. { for heating liquids, e.g. for vaporising, for concentrating}
<b>F23D 2200/00</b>	<b>Burners for fluid fuel</b>
<b>F23D 2201/00</b>	<b>Burners adapted for particulate solid or pulverulent fuels</b>
<a href="#">F23D 2201/10</a>	. Nozzle tips
<a href="#">F23D 2201/101</a>	.. tiltable
<a href="#">F23D 2201/20</a>	. Fuel flow guiding devices
<a href="#">F23D 2201/30</a>	. Wear protection
<b>F23D 2202/00</b>	<b>Liquid fuel burners</b>
<b>F23D 2203/00</b>	<b>Gaseous fuel burners</b>
<a href="#">F23D 2203/002</a>	. Radiant burner mixing tubes
<a href="#">F23D 2203/005</a>	. Radiant burner heads
<a href="#">F23D 2203/007</a>	. Mixing tubes, air supply regulation
<a href="#">F23D 2203/10</a>	. Flame diffusing means
<a href="#">F23D 2203/101</a>	.. characterised by surface shape
<a href="#">F23D 2203/1012</a>	... tubular
<a href="#">F23D 2203/1015</a>	... spherical
<a href="#">F23D 2203/1017</a>	... curved
<a href="#">F23D 2203/102</a>	.. using perforated plates

- F23D 2203/1023 . . . with specific free passage areas
- F23D 2203/1026 . . . with slotshaped openings
- F23D 2203/103 . . using screens
- F23D 2203/104 . . Grids, e.g. honeycomb grids
- F23D 2203/105 . . Porous plates
- F23D 2203/1055 . . . with a specific void range
- F23D 2203/106 . . Assemblies of different layers
- F23D 2203/107 . . coated with catalysts
- F23D 2203/108 . . with stacked sheets or strips forming the outlets

**F23D 2204/00 Burners adapted for simultaneous or alternative combustion having more than one fuel supply**

- F23D 2204/10 . gaseous and liquid fuel
- F23D 2204/20 . gaseous and pulverulent fuel
- F23D 2204/30 . liquid and pulverulent fuel

**F23D 2205/00 Assemblies of two or more burners, irrespective of fuel type**

**F23D 2206/00 Burners for specific applications**

- F23D 2206/0005 . Liquid fuel burners adapted for use in locomotives
- F23D 2206/001 . Liquid fuel burners adapted for use in automobile steam boilers
- F23D 2206/0015 . Gas burners for use in retort furnaces
- F23D 2206/0021 . Gas burners for use in furnaces of the reverberatory, muffle or crucible type
- F23D 2206/0026 . Vapour burners adapted for use in illumination devices
- F23D 2206/0031 . Liquid fuel burners adapted for use in welding lamps
- F23D 2206/0036 . . Liquid fuel burners adapted for use in welding and cutting metals
- F23D 2206/0042 . Vapour burners for illumination by radiation, with vaporiser heated by an auxiliary flame
- F23D 2206/0047 . Vapour burners for illumination by radiation, with vaporiser heated by the main flame
- F23D 2206/0052 . Vapour burners for illumination by radiation, with vaporiser heated by conduction
- F23D 2206/0057 . Liquid fuel burners adapted for use in illumination and heating
- F23D 2206/0063 . . Catalytic burners adapted for use in illumination and heating
- F23D 2206/0068 . Gas burners for illumination with slot type nozzles

- F23D 2206/0073
  - . Gas burners for illumination with Argand nozzles
- F23D 2206/0078
  - . Gas burners adapted for use in lamps with preheated air
- F23D 2206/0084
  - . Gas burners adapted for use in ceiling and wagon lamps
- F23D 2206/0089
  - . Gas burners for illumination using acetylene as a fuel
- F23D 2206/0094
  - . Gas burners adapted for use in illumination and heating
- F23D 2206/10
  - . Turbines
- F23D 2207/00** **Ignition devices associated with burner**
- F23D 2208/00** **Control devices associated with burners**
- F23D 2208/005
  - . Controlling air supply in radiant gas burners
- F23D 2208/10
  - . Sensing devices
- F23D 2209/00** **Safety arrangements**
- F23D 2209/10
  - . Flame flashback
- F23D 2209/20
  - . Flame lift-off / stability
- F23D 2209/30
  - . Purging
- F23D 2210/00** **Noise abatement**
- F23D 2210/101
  - . using noise dampening material
- F23D 2211/00** **Thermal dilatation prevention or compensation**
- F23D 2212/00** **Burner material specifications**
- F23D 2212/005
  - . Radiant gas burners made of specific materials, e.g. rare earths
- F23D 2212/10
  - . ceramic
- F23D 2212/101
  - . . Foam, e.g. reticulated
- F23D 2212/103
  - . . Fibres
- F23D 2212/105
  - . . Particles
- F23D 2212/20
  - . metallic
- F23D 2212/201
  - . . Fibres



F23D 2212/203	. . . Particles
<b>F23D 2213/00</b>	<b>Burner manufacture specifications</b>
<b>F23D 2214/00</b>	<b>Cooling</b>
<b>F23D 2700/00</b>	<b>TBD</b>
F23D 2700/001	. Air supply for wick burners
F23D 2700/002	. Wick burners without flame spreaders or burner hood
F23D 2700/003	. Wick burners with flame spreaders or burner hood
F23D 2700/004	. Inverted wick burners, wick burners using preheated air
F23D 2700/005	. Wick burners using alcohol as a fuel
F23D 2700/006	. Wick burners using oil as a fuel
F23D 2700/009	. Details of blue flame wick burners
F23D 2700/01	. Blue flame burners without flame spreader or burner hood
F23D 2700/011	. Blue flame burners with flame spreader or burner hood without a bead at the wick carrying tube
F23D 2700/012	. Blue flame burners with flame spreader or burner hood with a bead at the wick carrying tube
F23D 2700/013	. Blue flame burners with flame on one side only without a bead at the wick carrying tube
F23D 2700/014	. Blue flame burners with flame on one side only and a bead at the wick carrying tube
F23D 2700/015	. Tubes carrying the wick
F23D 2700/016	. Safety devices for wick carrying tubes
F23D 2700/017	. Wick adjusting devices directly engaging the wick
F23D 2700/018	. Wick adjusting devices engaging the tube carrying the wick
F23D 2700/019	. Wick stop devices and wick fixing devices
F23D 2700/02	. Devices for mounting the wick to the carrier
F23D 2700/021	. Burners in which the gas produced in the wick is not burned instantaneously
F23D 2700/022	. Burners using carburetted gas

- F23D 2700/023 . Gasifying and evaporating devices
- F23D 2700/024 . Nozzles and cleanig devices therefor
- F23D 2700/025 . Mixing tubes and burner heads
- F23D 2700/026 . Preheating devices, starting devices
- F23D 2700/027 . Vaporisers with devices for controlling the feeding of the fuel
- F23D 2700/03 . Alcohol vapour burners
- F23D 2700/031 . Vapour burners where the vaporiser is heated by an auxiliary flame
- F23D 2700/032 . Vapour burners where the vaporiser is heated by the main flame itself
- F23D 2700/033 . Vapour burners where the vaporiser is heated by conduction
  
- F23D 2900/00      Special features of, or arrangements for burners using fluid fuels or solid fuels suspended in a carrier gas**
  
- F23D 2900/00001 . local catalytic coatings applied to burner surfaces
- F23D 2900/00002 . Cleaning burner parts, e.g. burner tips
- F23D 2900/00003 . Fuel or fuel-air mixtures flow distribution devices upstream of the outlet
- F23D 2900/00004 . Burners specially adapted for generating high luminous flames, e.g. yellow for fuel-rich mixtures
- F23D 2900/00006 . Liquid fuel burners using pure oxygen or O<sub>2</sub>-enriched air as oxidant ([for gaseous fuels F23D 14/32](#))
- F23D 2900/00008 . Burner assemblies with diffusion and premix modes, i.e. dual mode burners
- F23D 2900/00011 . Burner with means for propagating the flames along a wall surface
- F23D 2900/00012 . Liquid or gas fuel burners with flames spread over a flat surface, either premix or non-premix type, e.g. "Flächenbrenner"
- F23D 2900/00013 . . with means for spreading the flame in a fan or fishtail shape over a melting bath
- F23D 2900/00014 . Pilot burners specially adapted for ignition of main burners in furnaces or gas turbines
- F23D 2900/00015 . Pilot burners specially adapted for low load or transient conditions, e.g. for increasing stability
- F23D 2900/00016 . Preventing or reducing deposit build-up on burner parts, e.g. from carbon
- F23D 2900/00017 . Assembled burner modules

- F23D 2900/00018 . Means for protecting parts of the burner, e.g. ceramic lining outside of the flame tube
- F23D 2900/00019 . Outlet manufactured from knitted fibres
- F23D 2900/01001 . Pulverised solid fuel burner with means for swirling the fuel-air mixture
- F23D 2900/03081 . Catalytic wick burners
- F23D 2900/03082 . Wick made of specific material, e.g. ceramic
- F23D 2900/05001 . Burner using gel type fuel
- F23D 2900/05002 . Use of porous members to convert liquid fuel into vapor
- F23D 2900/11001 . Impinging-jet injectors or jet impinging on a surface
- F23D 2900/11002 . Liquid fuel burners with more than one nozzle
- F23D 2900/11101 . Pulverising gas flow impinging on fuel from pre-filming surface, e.g. lip atomizers
- F23D 2900/11401 . Flame intercepting baffles forming part of burner head
- F23D 2900/11402 . Airflow diaphragms at burner nozzle
- F23D 2900/11403 . Flame surrounding tubes in front of burner nozzle
- F23D 2900/14 . Special features of gas burners
- F23D 2900/14001 . . . Sealing or support of burner plate borders
- F23D 2900/14002 . . . of premix or non premix types, specially adapted for the combustion of low heating value (LHV) gas
- F23D 2900/14003 . . . with more than one nozzle
- F23D 2900/14004 . . . with radially extending gas distribution spokes
- F23D 2900/14005 . . . Rotary gas burner
- F23D 2900/14021 . . . Premixing burners with swirling or vortices creating means for fuel or air
- F23D 2900/14041 . . . Segmented or straight line assembly of burner bars
- F23D 2900/14042 . . . Star shaped assembly of burner bars or arms
- F23D 2900/14061 . . . for cooking ranges having a coated burner cap
- F23D 2900/14062 . . . for cooking ranges having multiple flame rings
- F23D 2900/14063 . . . for cooking ranges having one flame ring fed by multiple venturis
- F23D 2900/14064 . . . Burner heads of non circular shape
- F23D 2900/1412 . . . for radiant burners
- F23D 2900/14121 . . . . with radiation intensifying means
- F23D 2900/14122 . . . . with extra radiation grids, e.g. strips or rods
- F23D 2900/14123 . . . . with radiation intensifying perforated plates
- F23D 2900/14124 . . . . cooperating with refractory wall surfaces
- F23D 2900/14125 . . . . with extra radiation screens, e.g. wires, threads or gauzes

- F23D 2900/14181 . . . Catalytic type with carbon containing radiating surface
- F23D 2900/14241 . . Post-mixing with swirling means
- F23D 2900/14381 . . Single operating member opening and closing fuel and oxidant supply valves in torches
- F23D 2900/14481 . . Burner nozzles incorporating flow adjusting means
- F23D 2900/14482 . . Burner nozzles incorporating a fluidic oscillator
- F23D 2900/14581 . . with outlets consisting of a bed of irregular particles, e.g. glass
- F23D 2900/14582 . . with outlets consisting of layers of spherical particles
- F23D 2900/14641 . . with gas distribution manifolds or bars provided with a plurality of nozzles
- F23D 2900/14642 . . with jet mixers with more than one gas injection nozzles or orifices for a single mixing tube
- F23D 2900/14681 . . Adding steam or water vapor to primary or secondary combustion air
- F23D 2900/14701 . . Swirling means inside the mixing tube or chamber to improve premixing
- F23D 2900/21 . Burners specially adapted for a particular use
  - F23D 2900/21001 . . for use in blast furnaces
  - F23D 2900/21002 . . for use in car heating systems
  - F23D 2900/21003 . . for heating or re-burning air or gas in a duct
  - F23D 2900/21004 . . for use in gas fed fireplaces
  - F23D 2900/21005 . . for flame deposition, e.g. FHD, flame hydrolysis deposition
  - F23D 2900/21006 . . for heating a catalyst in a car
  - F23D 2900/21007 . . for producing soot, e.g. nano particle soot